

## Measuring Efficiency of Life Insurance Institution in Indonesia: Data Envelopment Analysis Approach

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**Abstract:** This study aims to measure the level of efficiency of the life insurance industry in Indonesia. The calculation of the efficiency level in this study is relative, not absolute. The approach used is Data Envelopment Analysis (DEA). There are 8 research objects: Prudential, BNI Life, PaninDai-IchiLife, Asuransi Jiwasraya and Life Insurance Adisaranan Wanaartha, Takaful Takaful Insurance, Amanahjiwa Giri sharia insurance and Al-Amin sharia life insurance. This study consists of three input variables Cost of Commisive (X1), Operational Cost (X2), Total Equity (X3) and 2 output variables (Premium) (Y1) and Investment Revenue (Y2). The results explain that there are 15 perfectly efficient DMUs (100%). And an inefficient of 24 DMU, consisting of 7 DMU conditions IRS and 17 DMU with DRS conditions. Of all the DMU observed, Prudential insurance is a life insurance company that is able to maintain its gradual efficiency level from 2013 to 2016 when compared to other life insurance in this observation. In general, the main factor inefficiency of life insurance industry in Indonesia (in observation) from 2012 to 2016 is from the output side. To be more efficient then life insurance companies should increase the value of premiums by 91% and investment income of 8%.

**Keywords:** Cost of Commisive, Operational Cost, Total Equity Investment Revenue

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### Introduction

The Non Bank Financial Institution is one of the most important components of the financial system and serves as a productive intermediary of activities in the National Economy. In addition, the Non-Bank Financial Institution has become an alternative source of funding than Banking, and protecting against business risks or anything related to the economy. According to the chief executive of OJK IKNB supervisor Firdaus Djaelani said throughout in 2016, total assets of Non-Bank Financial Institution reached Rp1, 907 trillion or grew 14.5% ,if we compared to total assets in the previous year which reached Rp 1,665 Triliyun. In terms of assets, the largest contribution for the growth of IKNB's assets came from the insurance institution with total achievement of Rp 675, 34 Trillions. Where this growth grew by 13.19% if we compared with last year's realization (Business Finance 2017).

The Asset growth in Insurance Institution in the past five years shows the progress of the Insurance institution in the last few years . As one of the Non Banking Financial Institution, Insurance institution has an important role in economic and social development by minimizing the risk of all economic activities, in another side also by channeling financial resources in the form of investments to make the economy run well. Insurance companies offer different services to households and businesses for their welfare. The main services provided by insurance companies is to provide coverage of risks to loss of property, business and life or otherwise. Thus, insurers encourage individuals and entrepreneurs who avoid the risk of engaging in activities with high returns but of course with higher risks (Khan et al 2014).

The development of Insurance Institution in Indonesia, if we viewed from five years back precisely from the year 2011-2015, where insurance institution assets had an average growth increase from 2011-2015 increased by 16.23% per year. The total assets of life insurance companies increased by 2.71% from Rp368.06 trillion in 2014 to Rp378.03 trillion in 2015. Meanwhile, total assets of general insurance companies increased by 6.49% from Rp116.46 trillion in 2014 to trillion in 2015. While the number of reinsurance company assets increased by 43.9% from Rp 10.29 trillion in 2014 to Rp 14.81 trillion by 2015. The amount of assets of social insurance organizers increased by 8.36% from Rp 2019.41 trillion in 2014 to Rp 226.92 in 2015. And the number of assets of the insurer's insurance companies increased 5.98% from Rp103.46 trillion in 2014 to Rp 109.65 trillion in 2015. The Growth of insurance institution's asset for the last five years can be seen in the table below

**Table 1**  
**The Number of asset Insurance institution 2011-2015**

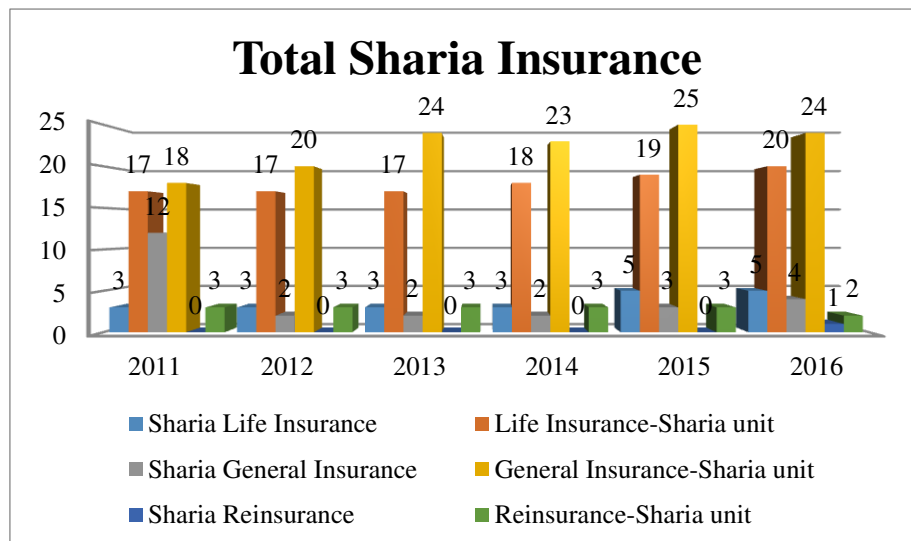
<b>Description</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>
<b>Life Insurance</b>	228,8	270,28	293,74	368,06	378,03
<b>Non Life Insurance</b>	54,67	71,96	100,99	116,46	124,01
<b>Reinsurance</b>	3,21	4,69	6,45	10,29	14,81
<b>Sosial Insurance</b>	121,93	144,96	162,16	209,41	226,92
<b>Mandatory Insurance</b>	73,14	92,12	96,38	103,46	109,69
<b>Total</b>	481,75	584,02	659,72	807,68	853,42

Source : Publication OJK ( in unit billion)

Based on Table 1 above, it is show that the life insurance institution is experiencing significant growth and has the largest assets with a portion of 44% of total assets in 2015. If we compared with other insurance industries. It can explains that the income of the national life insurance institution continues to grow and develop sustainably, because there is increasing of public awareness about the importance of life insurance.

Besides, along with the growth of the conventional insurance institution as well, the vibrant Islamic economy caused by the resilience of Muamalat bank during the crisis in 1998, made various financial institutions began to pay attention and interest to the sharia economy ,that implemented by Bank Muamalat. One of the financial institutions that glance at sharia principles is insurance.

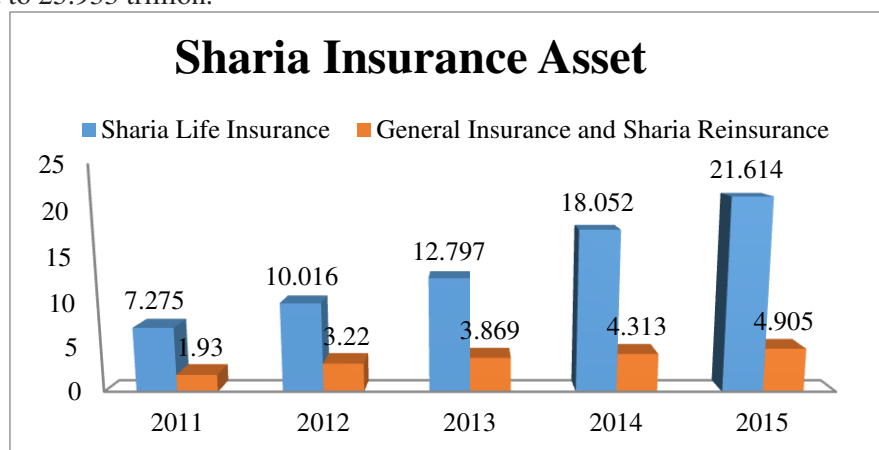
The Sharia Insurance in Indonesia has grown rapidly. Competition of Islamic insurance business in Indonesia increasingly and crowded with emerging new players, both from life insurance and insurance losses / general with the principles of sharia. While reinsurance sharia also experienced a change in composition, that is from the whole company that just sharia unit into a sharia (full fledge) by doing spin off. This is supported by the provisions of the Law on Insurance in paragraph 4 of article 17 which has been ratified by the House of Representatives (DPR) stating that insurance and reinsurance companies that have sharia units with tabarru 'value and investment funds of participants have reached at least 50 percent of the total value of participant's insurance fund at an individual company or 10 years since the enactment of the insurance law, shall be required to spin-off the sharia unit into a sharia (full fledge) insurance company (SAL.POJK05, 2016).



**Figure 1**  
**The Development of Amount of Sharia Insurance in Indonesia**  
**Source: OJK Data**

Since the establishment of the first sharia insurance in Indonesia, The family takaful insurance and takaful insurance in general until 1994 until 2015. The number of sharia insurance in Indonesia has grown to 53 Industries. In July 2016, the number of sharia insurance in Indonesia increased to 56 industries. And it can be concluded also on the graph above that the number of sharia insurance in Indonesia is relatively increasing and the development of sharia continues to increase. The government's regulation according about minimum capital of insurance, and the plans of some sharia insurance companies to spin off under the laws of insurance, it can be predicted that in the next few years the number of sharia insurance will continue to increase (Adiwarman Karim 2017).

Along with the increasing number of Sharia Insurance in Indonesia, the number of assets in this instution also increased. Recorded in 2011 sharia asset growth amount 9,205 trillions and in 2015 total asset of sharia in Indonesia equal to 26,5 trillion. Where the growth of sharia insurance assets in 2011-2015 dominated by sharia life insurance. If we viewed in 2015, The Sharia life insurance assets equal to 97 percent of total assets of Islamic insurance amounted to 25.933 trillion.



**Figure 2**  
**Sharia Insurance Assets**  
**Source: Adiwarman Karim Consulting**

If we see a graph above, the asset of life insurance sharia in 2015 increased to Rp26, 5 trillion or an increase of 15.8% from the previous year. Based on the explanation described above, it can be explained that in general, the life insurance institution whether conventional or syariah has a larger asset than others.

This case becomes one of the main objectives the author to analyze more deeply related to the efficiency of life insurance both conventional and sharia. Because the level of efficiency is very important to know as the institution financial Non Bank. Where it is useful to know how the managerial capabilities of the sharia's insurance companies in managing the company. Another factor of the importance of assessing the efficiency level of sharia insurance companies is because of the demands of competition with conventional insurance. In addition, by knowing the efficiency of an insurance company. Customers can assess the performance of the company. So the level of customer confidence will be much greater than before.

There is an expanding body of literature to know the extent of the efficiency and performance of insurance companies in running their business processes. Several studies have done the study mainly through the measurement of efficiency frontier. The frontier efficiency of a financial institution is measured by how the performance of the financial institution is relative to the best performance estimates of the financial institution of the institution. Measurement of efficiency by using DEA approach (Data Envelopment Analysis) is a method widely used to analyze the efficiency of frontiers in this case to technically, allocative and cost efficiency.

In this study aims to find out the first few things, how the condition of the efficiency level of the life insurance institution in Indonesia. second, how to compare the level of efficiency of conventional life insurance and sharia life insurance, third, which one the life insurance companies in Indonesia that enter into the high, medium and low efficient and the Fourth, what is the steps can be done in order to improve the efficiency of life insurance. The object of research taken is an insurance company that has financial statements from the year 2012-2016. Conventional insurance consists of five conventional life insurances with the largest assets of PT Prudential, PT BNI Life Insurance, PT Panin Dai-ichi Life, PT Jiwasraya and PT AJ Adisanann Wanaaertha. As for Takaful Syariah, PT Amanahjiwa Giri and PT Al Amin insurance.

The Research on the analysis of efficiency level in sharia or conventional insurance companies by using DEA method has also been done by several researchers in Asian countries. Such as research by Xiaoling Hu and Nong Zhu on the efficiency between private and state insurance companies where based on the results of the study explained that there is a significant efficiency difference between companies based on ownership. First, state-owned insurance companies achieve the highest efficiency ratings among all insurance companies. This may be due to the long-term support received from the central and regional regions as well as the monopoly status that makes economies of scale and scope scale. The two foreign-owned foreign-owned insurance companies value technically and scaled efficiency rather than joining other companies or entering into joint ventures. Furthermore, Sumninder (2015) examines the efficiency of life insurance companies in Punjabi. Where he found In this study found that the existence of very low penetration rate and insurance density in Punjabi. Indian swedish companies are well aware of the fact that there are still large numbers of people who have not been covered by insurance companies where, the company claims that the Indian market has enough potential to be exploited. Premium growth and number of policies show positive growth. The results of the study also found that LIC is efficient in all years of constant returns. So it is with private insurance companies that proved efficient in the first four years.

Khan and Noreen (2014) compare the level of conventional insurance efficiency with sharia insurance with case studies in Pakistan. The results showed that sharia insurance is more efficient because the company can use its input optimally. Hulwah and Sepky (2016) compared the level of sharia and conventional efficiency in Indonesia. The results of his research explains

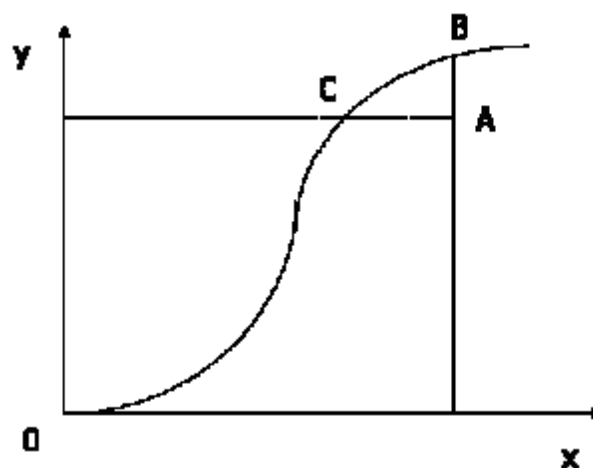
that tingkat efficiency of Islamic insurance companies in the group of general insurance companies sharia does not reach efesien level. Whereas in sharia unit of general insurance category there are 2 companies from 7 companies that we tyake from efesien samples optimally. In the group of sharia life insurance companies no one reaches the optimal efficient level. And the last in sharia unit unit of life insurance from 12 companies that made the research sample there are 4 companies that able mencpai efficient level optimally or as 255 companies that efficiently optimally in managing the risk of the participants insurance. Khan and Noreen (2014) compare the level of efesiensi Conventional insurance with sharia insurance with case studies in Pakistan. The results showed that sharia insurance is more efficient because the company can use its input optimally. Hulwah and Sepky (2016) compared the level of sharia and conventional efficiency in Indonesia. The results of his research explains that tingkat efficiency of Islamic insurance companies in the group of general insurance companies sharia does not reach tingkat efesien. Whereas in sharia unit of general insurance category there are 2 companies from 7 companies that dijasikan samples yag efesiesn optimally. In the group of sharia life insurance companies no one reaches the optimal efficient level. And the last in sharia unit unit of life insurance from 12 companies that are used as research samples there are 4 companies that can mencpai efficient level optimal or 255 companies that efficiently optimally in managing the risk of the participants of insurance.

## Theoretical Basis

### Theory of Efficiency

The theory of efficiency is closely related to consumption theory and production theory in microeconomics. Efficiency in consumption theory is where the consumer has the ability to maximize the utility or satisfaction that will be fulfilled. Whereas in production theory is where a company can generate maximum profit on production done. In conventional literature, production theory will describe the company's treatment of buying and using inputs for production and originating outputs of products produced. With so on the theory of production will see the company's ability to maximize profits and optimize its efficiency. Efesien will be optimal if the company can maximize output by using fixed input or by minimizing the use of input to achieve the same level of output (karim, 2007)

Judging from economic theory there are two kinds of understanding of efficiency, namely technical efficiency and economic efficiency. Economic efficiency has a macroeconomic point of view, while technical efficiency has a microeconomic point of view. Measurement of technical efficiency is limited to technological and operational relationships in the process of converting inputs into outputs. While in economic efficiency, price can not be considered given, because the price can be influenced by macro policy (Ascarya, 2009).



According to Farrel (1957) the efficiency of the company consists of two components namely technical efficiency and allocative efficiency. Technical efficiency reflects the ability of a company to produce output with a number of available inputs. While the allocative efficiency reflects the company's ability to optimize its input utilization, with price structure and production technology. Both of these measures are then combined into economic efficiency. A company can be said to be economically efficient if it minimizes production costs to produce a particular output with a commonly used level of technology and prevailing market prices.

### **Measurement of Efficiency**

One of the commonly used efficiency is through the frontier approach. In the frontier efficiency approach can be divided into two namely through the approach of the frontiers of the metric and non-parametric frontier approach. Where the parametric frontier approach can be measured by parametric statistical tests such as Stochastic Frontier Approach (SFA), Thick Frontier Approach (TFA) and Distribution Free Approach (DFA). While the approach through non-parametric is to use Data Envelopment Analysis (DEA) method. In this statistical parametric test is a source of research, whereas in non-parametric statistical test is a test that the requirements do not specify about the parent sample research (Gitman, 2013).

In the last few years, the performance of financial institutions has focused on the forward efficiency or x-efficiency, which measure deviations from financial institutions based on "best practice" or is common to the frontiers of their efficiency. Thus, the efficiency of the forward of a financial firm is measured by how the performance of the financial institution is relative to the "best" financial institution's performance estimates of the institution, with the record that all financial institutions face the same market conditions.

Frontier efficiency can also be used in regulatory analysis to measure the effect of mergers and acquisitions. Capital regulation, deregulation of deposit rates and a shift in geographical retrofit on the branches and holdings of the acquisition companies. The main advantages of this indicator compared to other indicators are quantitative measurements by eliminating the effects of market prices and other exogenous factors that influence the performance to be observed (Ascarya, 2009).

There are two types of approach models that can be used in the insurance institution, among others:

1. Operational Approach (production)
2. Investment Approach (Intermediation)

The operational approach describes an insurance company as a service producer. They use resources such as salaries and expenses to meet funding to policyholders and provide a loss to clients or insurance customers. While investment, in this case the insurance company obtained acting as intermediary. Funds incurred from premiums since the initial period of insurance earned during the year and not specified as allocation of claims, then the main investment in bonds and stocks. The purpose of this approach is to measure the firm's ability to generate returns on investment activities (Hewlitt, 1998).

According to Al Amri (2015) efficiency assessment can be seen from three kinds of efficiency, namely:

1. Technical Efficiency. Technical efficiency can be seen and assessed from how efficiently the technology is used in achieving a certain level of output on the inputs used. Technical efficiency can be divided into two, namely pure efficiency and scale efficiency.
2. Allocative efficiency. The efficiency of this allocation of measurement refers to how efficient management in choosing inputs used with the cost or price that need to be issued. In other words, if the inputs allocated to produce output can not be used or the consumer wants, this means that the input is not used efficiently.

3. Cost Efficiency. Cost efficiency is a combination of technical efficiency and allocative efficiency. The production of a company is said to be efficient in its cost if the firm uses the least cost input or cost in generating output.

### **Previous Research**

Some research on the level of efficiency in sharia and conventional insurance companies has been done by several countries in Asia while in Indonesia is still not many. The majority of researchers in Asia make comparisons between sharia insurance and conventional insurance or a comparison between private insurance and state insurance. Here is a description of some previous reviewers that discuss the efficiency ratios of insurance companies.

Norma Md Saad and M Shabri Abd Majid (2006) sought to compare the performance of conventional life insurance companies and Takaful operators in Malaysia. The variable used consists of input and output variables. Variable input is the cost of commission and management costs while the output variables are investment and premium income. Overall, Takaful Insurance Company is below the average of total production factors but slightly above average for technical changes. However, in the case of efficiency and pure efficiency change, Takaful is below average except for changes in scale efficiency. Where takaful has equaled the institution average. Takaful can be considered as a competitive company when compared to conventional insurance

The next researcher was conducted by Kwadjo Ansah-adu, Charles Andoh and Joshua Abor (2012). This research was to evaluate the cost efficiency of insurance companies in Ghana using DEA. This study also examines the determinants of the efficiency of insurance companies. The variable used consists of input and output variables. Variable output includes profit or loss, net premiums and investment income. While input variables consist of total assets, total operational costs and total investment. Based on the results of DEA analysis provides information on how to improve companies efficiency that are not efficient. In the three years of data examined from a sample of 30 insurance companies, 3 firms increased their cost efficiency, 25 firms were inconsistent with their cost efficiency that they specified. And 2 companies suffered a setback in the cost of its efficiency. This decline may be directly attributable to the consistent decline of market share in the period reviewed. It also proves that market share competition is in great demand by various players (institution players).

Rabindra Ghimire (2016) This study aims to make an assessment of the sector efficiency in life insurance of Nepal by using DEA. The data used consists of two variables namely input and output variables. Variable output includes other income, investment gross and gross premiums on input variables including total assets, claims and other expenses. Based on the research, it shows that the average efficiency score of eight firms fluctuated and decreased during the period of observation. The scale efficiency follows a similarly similar pattern of fluctuations. The study also provides insight into the different types of life-saving efficiency in Nepal based on the DEA approach that may work for regulators, operators, researchers and academics to frame the idea of Nepal's insurance.

And the last of these researches is done by Atiquzzafar Khan and Uzma Noree (2014) to analyze efficiency and productivity of conventional insurance and takaful companies. By measuring the performance of the insurance and takaful industries and trying to explore the relationship between efficiency and productivity. The results of the analysis show that insurance companies remain efficient in technical show efficiency about 89 percent during the period of observation. Similarly, the results also show a 74 percent scale efficiency that represents a significant expansion in the insurance sector in Pakistan. But the other side of the insurance sector experienced inefficiency allocation which is dominated by cost efficiency. The empirical results of the cost efficiency show that takaful is more efficient than the conventional counterpart because of its high allocative efficiency. This leads to the conclusion that their input choices are optimal.

## Methodology

This study uses secondary data during the period 2012-2016 which has been published as principal data, such as financial statements, balance sheets, and cash flow statements. The principal data can be obtained from the publications issued by each insurance company. However, due to the limited data available, Al-Amin shariah insurance companies are only available from 2013 to 2016. The other 7 relatively complete life insurance has data from 2012-2016.

The study in this study focuses on measuring the efficiency level of 8 (eight) life insurance companies, both conventional and sharia. Initially, the author chose 5 conventional life insurance and 5 life insurance sharia with the biggest asset. Sharia life insurance is the object, is Takaful insurance is not a business unit of the parent, but who has full fledge. But due to limited data availability, there are only 3 sharia life insurance that enter in the object of research.

The five conventional life insurance companies are Prudential, BNI Life, Panin Dai-ichiLife, Asuransi Jiwasraya and Life Insurance Adisaranan Wanaartha. Meanwhile, sharia life insurance companies that become the object of research is Takaful sharia insurance, Amanahjiwa Giri sharia insurance and Al-Amin sharia life insurance.

The methodology used in this research is Nonparametric Data Envelopment Analysis (DEA) approach. According to Charnes et al. (1978); Banker et al. (1984) stated that DEA is a mathematical programming technique that measures the efficiency level of a Decision Maker Unit (UPK) or a decision making unit relative to a similar UPK when all of these units are at or below the efficient "frontier" curve

DEA is a method of measuring input-based output efficiency (Coelli, 1998). Cooper et al (1999) and Farrell (1957)). The output variables of DMU consist of Total Premium (Y1) and Investment Revenue (Y2), while input variables consist of Commission Cost (X1), and Operational Cost (X2) and Equity (X3). DEA score will be obtained from these variables, which is the result of the division between input and input factors (Charnes, Cooper and Rhodes, 1978). And the value of productivity is derived from the value of Total Factor Productivity (TFP).

Furthermore, the study will try to focus on answering some research questions. Among them, how the position of the level of efficiency of each life insurance from year to year and how the distribution of the score. How also the condition of return to scale of each DMU and development potential for insurance companies that have not been efficient. Equally important, the research will answer which inputs and outputs are contributing to the level of efficiency that has been achieved

## Data Envelopment Analysis

DEA is a mathematical program optimization method that measures the technical efficiency of a Decision Maker Unit (DMU), and compares relative to other DMUs (Charnes et al. 1978) and (Banker et al., 1984). The assumption of efficiency ratio maximization makes this DEA research using output orientation in calculating technical efficiency. Another orientation is input minimization, but the two assumptions will be obtained the same result (Sutawijaya dan Lestari: 2009)

There are three benefits derived from the measurement of efficiency with DEA (Insukindro et al: 2000), first, as a benchmark for obtaining relative efficiency useful to facilitate comparison between the same economic units. Second, measure the various efficiencies between economic units to identify the causal factors, and third, to determine the policy implications so as to increase their efficiency



Initially, DEA was used to overcome the deficiencies possessed by ratio and multiple regression analysis. Ratio analysis is only able to provide information that certain UPKs have the special ability to convert one type of input to one specific output type, whereas multiple regression analysis combines multiple outputs into one. DEA is designed to measure the relative efficiency of an UPK that uses more than one input and output, in which the incorporation is not possible. The relative efficiency of an UPK is the efficiency of an UPK compared to other UPKs in a sample using the same type of input and output. DEA formulates the UPK as a fractional linear program to find a solution if the model is transformed into a linear program with a weighted value of input and output.

In the case of varying inputs and outputs, the efficiency of an UPK is computed by transforming into single inputs and outputs. This transformation is done by determining the proper weights. This weighting determination is always a problem in efficiency measurement. DEA is used to solve problems by giving each UPK the freedom to determine its respective weightings (Sutawijaya dan Lestari: 2009)

## **Result**

### **Score Eficiency**

In the table below shows the value of the efficiency of each life insurance, it can be seen that an efficient life insurance (Constant 100%) in 2016 are Jiwasraya insurance, Prudential, Takaful Adisaranan Wanaartha insurance and Amanah Jiwa Giri insurance. Meanwhile, an efficient life insurance company in 2015 is Prudential and Takaful Adisaranan Wanaartha.

Then in 2014, an efficient life insurance those are Jiwasraya insurance, Prudential, PaninDai IchiLife and sharia insurance Adisaranan Wanaartha. In 2013, which achieved maximum efficiency are: Prudential and Jiwasraya insurance. Meanwhile in 2012, there are 3 efficient insurance those are Jiwasraya, Adana Wanaartha and Amanah Jiwa Giri insurance.

So it can be concluded that Prudential's insurance can maintain the gradual efficient level from year to year from 2013 to 2016 when compared with other life insurance in this observation.

Based on the information table, life insurance is the lowest efficiency rate is Takaful Amanah Jiwa Giri insurance in 2013 which only reached the efficiency rate of 10.85%. This can certainly be a consideration for life insurance companies that have not been efficient to improve technical efficiency (pure technical efficiency)

In addition, if we look at the inefficient life insurance it can be seen from the table below that the inefficient DMU is divided into two parts: Increasing Return to Scale (IRS) and Decreasing Return to Scale (DRS). Insurers included in Prudential (2012), Jiwasraya (2015), PaninDai IchiLife (2016, 2015) and BNI Life (2014, 2015 and 2016). To achieve the efficient level of the seven DMUs, it can still be attempted by looking at the value of its potential improvement. Unlike the case of life insurance that includes decreasing are: PaninDai (2012, 2013), Adisaranan Wanaartha (2013), BNI Life (2012, 2013), Amanah Jiwa Giri (2015, 2014, 2013), al-Amin (2013, 2014, 2015, 2016), and Takaful (2012, 2013, 2014, 2015, 2016).

**Table 2**  
**Score Efficiency**

Unit	Score	Scale	Unit	Score	Scale
Amanah Jiwa Giri 2012	100	Constant	PaninDai-Ichilife 2016	50,17	Increasing
Amanah Jiwa Giri 2016	100	Constant	BNI Life 2012	48,75	Decreasing
AJ Adisaranan Wanaartha 2014	100	Constant	PaninDai-Ichilife 2015	47,84	Increasing
AJ Adisaranan Wanaartha 2015	100	Constant	BNI Life 2013	47,43	Decreasing
AJ Adisaranan Wanaartha 2012	100	Constant	Amanah Jiwa Giri 2015	39,4	Decreasing
PaninDai-Ichilife 2014	100	Constant	Al Amin 2014	35,03	Decreasing
Jiwasraya 2012	100	Constant	BNI Life 2014	34,34	Increasing
AJ Adisaranan Wanaartha 2016	100	Constant	BNI Life 2016	33,58	Increasing
Jiwasraya 2014	100	Constant	Al Amin 2015	28,87	Decreasing
Jiwasraya 2013	100	Constant	BNI Life 2015	25,31	Increasing
Prudential 2014	100	Constant	Al Amin 2016	17,37	Decreasing
Prudential 2015	100	Constant	Takaful Syariah 2012	15,51	Decreasing
Jiwasraya 2016	100	Constant	Takaful Syariah 2013	13,89	Decreasing
Prudential 2016	100	Constant	Takaful Syariah 2014	13,86	Decreasing
Prudential 2013	100	Constant	Takaful Syariah 2015	12,86	Decreasing
Prudential 2012	91,9	Increasing	Al amin 2013	12,65	Decreasing
Jiwasraya 2015	89,77	Increasing	Amanah Jiwa Giri 2014	12,53	Decreasing
PaninDai-Ichilife 2012	81,97	Decreasing	Takaful Syariah 2016	11,86	Decreasing
AJ Adisaranan Wanaartha 2013	81,79	Decreasing	Amanahjiwa Giri 2013	10,85	Decreasing
PaninDai-Ichilife 2013	72,29	Decreasing			

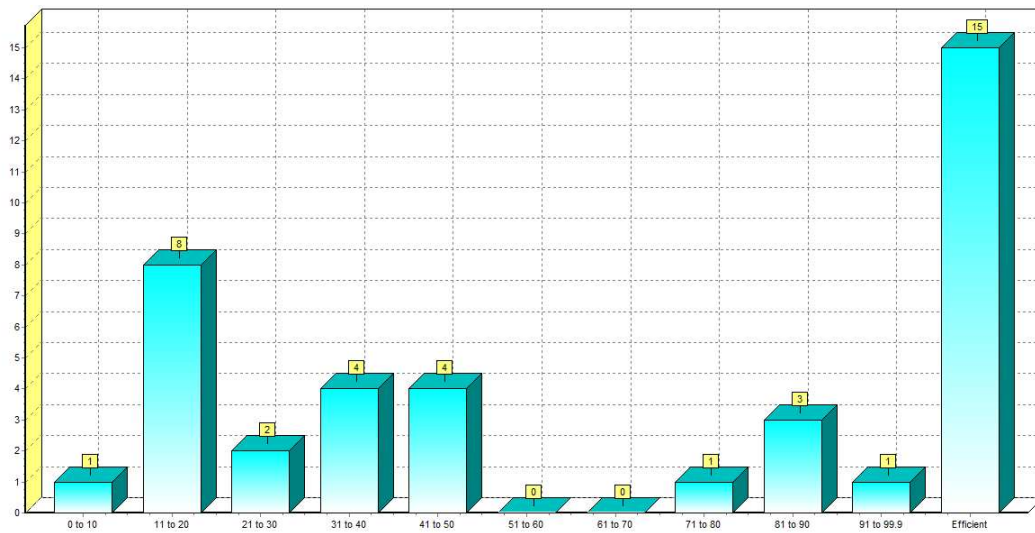
### Return to Scale

From the total 39 DMU which consists of 8 life insurance companies both conventional and syariah, there are 15 DMU that has reached 100% optimal efficiency level. While the other 24 DMUs still have not reached the maximum level of efficiency. In DEA known as RTS analysis or return to scale. This analysis explains the return scale when the input is added and how it impacts the output change. If the value is  $RTS > 1$ , then it is included in the DMU which increases return to scale (IRS). While if the RTS value  $< 1$ , then it is included in the DMU which decreasing return to scale (DRS)

From the above calculations, it appears that out of 24 inefficient DMUs, there are 7 DMUs falling into the IRS category and the remaining 17 DMUs fall into the DRS category. From these results explain that the condition of life insurance institution in Indonesia between the years 2012-2016 experiencing a relatively declining condition. This is inseparable from the macroeconomic conditions and the real sector which also experienced fluctuations in the period. In order to get out of these conditions then of course life insurance companies in general need to do a potential improvement is recommended in order to achieve a more optimal level of efficiency.

### Distribution Score

Associated with previous table information, the graph below provides information on the number of efficient and inefficient business units on a given group scale. Based on the following graphs can be seen the number of efficient life insurance companies (100%) or Fully Efficient is as much as 15 DMU. The chart below also provides information that most business units are in less than 50% efficiency or Low Efficient ie 19 DMU. There are 4 DMUs in the 80-99% or High Efficient category, and only 1 DMU is included in the Medium Efficient group or between 50-79%

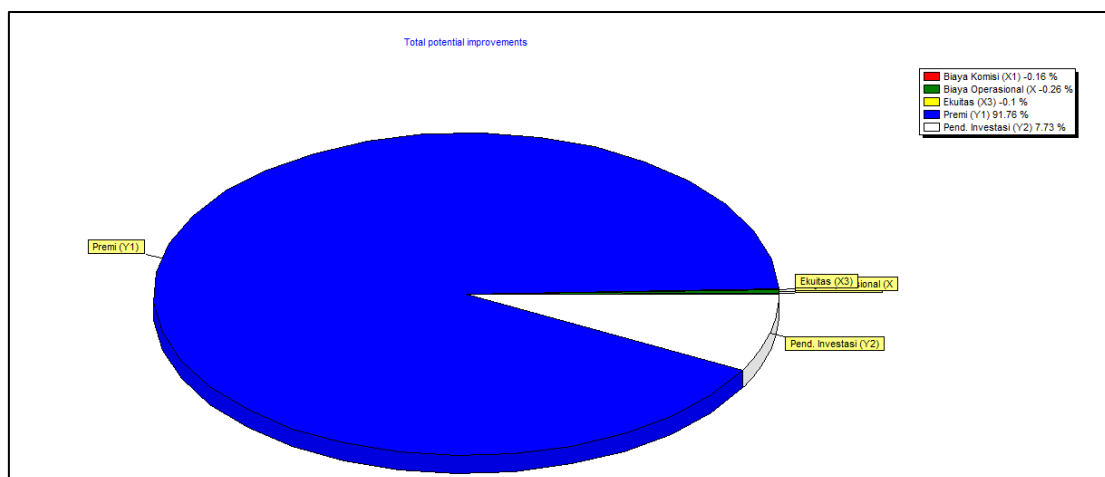


**Figure 3**  
**Distribution Score**

### Potential Improvement

Total Potential Improvement is used to know the inefficiency factor of life insurance institution. The graph below shows the total potential improvement information that can provide an overview of the inefficiencies of the life insurance institution. The total potential improvement graph shows that in institution, in order to be efficient, life insurance companies should increase the premium value by 91% and investment income by 8%. This needs to be done in order to achieve optimal levels of efficiency.

This means that the life insurance institution in general needs to be further enhanced assets and market sharenya. So it directly increases the premium value of the life insurance institution as a whole. Another meaning is that the public is still not yet literate on insurance, compared to the banking institution, for example. Thus, it is necessary to increase the financial literacy strategy of the Financial Services Authority.



**Figure 3**  
**Potential Improvement**

## Conclusion

The result have implications for the life insurance industry, both conventional or sharia in Indonesia. The following are some conclusions that can be taken along with recommendations for future research:

1. There are 15 perfectly efficient DMUs (100%). And an inefficient of 24 DMU, consisting of 7 DMU conditions IRS and 17 DMU with DRS conditions. The most inefficient life insurance is sharia Amanah Jiwa Giri insurance in 2013 with an efficiency rate of 10.85%.
2. From all DMU observed, Prudential insurance is a life insurance company that is able to maintain its gradual efficiency level from 2013 to 2016 when compared with other life insurance in this observation.
3. In general, the main factor inefficiency of life insurance institution in Indonesia (in observation) from 2012 to 2016 is from the output side. To be more efficient then life insurance companies should increase the value of premiums by 91% and investment income of 8%. This needs to be done in order to achieve optimal levels of efficiency.
4. In general, conventional insurance institution is relatively more efficient than sharia insurance. This is understandable, because the market share of Takaful is relatively small. The market share of sharia life insurance compared to total national insurance assets is about 6.5% in February 2017.
5. From the analysis results indicate that there are 15 DMUs (38%) that enter Fully efficient, 4 DMU (10%) classified as High efficient, 1 DMU (3%) in Medium efficient and 19 DMU (49%) including Low Efficient.
6. The Calculation of efficiency level in this research is relative, not absolute. So it is possible when the sample of insurance companies added or the year of observation expanded, will get different results.
7. Every conventional and sharia life insurance company need to issue its annual financial statements to improve accountability and transparency of fund management.
8. In addition, this financial report data is useful for researchers / academics to be used as a source of research data. With the ultimate goal of improving and developing the insurance institution in Indonesia.
9. The life insurance institution, both conventional and syariah need to calculate the level of efficiency regularly and periodically so that he knows the level of efficiency, potential improvement and the advantages in general, in the framework of efficiency analysis.
10. Because of the limitations of data that the authors obtain, the number of observations is still relatively small. Limitations are also due to differences in the year of observation from the insurance institution, although this is still tolerable.

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